

10/509040

DT09 Rec'd PCT/PTO 27 SEP 2004

Claims

1. Device for detecting a luminescence event in, at, or in the immediate vicinity of a cell, a cell cluster, or a tissue, having the following features:

(a) a carrier element (1) with a surface (100) prepared for direct or indirect coupling of cells,

(b) at least one optical detector (2) for receiving a luminescence signal, integrated into the carrier element (1) below surface (100),

characterized by the following further features:

(c) a cover (7) covering surface (100) to form a cavity (7), said cover having an inlet opening (8) and an outlet opening (9),

(d) an excitation source (21) connected to inlet opening (8).

2. Device according to Claim 1 in which a filter (4) is formed between surface (100) and the (at least one) detector (2).

3. Device according to Claims 1 or 2, in which the carrier element (1) is a semiconductor body.

4. Device according to one of the foregoing claims in which multiple detectors (2) are integrated into carrier element (1) below the surface (100) prepared for coupling the cells.

5. Device according to Claim 4, in which (the at least one) detector (2) is a photodiode.

6. Device according to one of the foregoing claims in which an evaluation circuit (11) connected to the (at least one) detector (2) is provided.

7. Device according to Claim 6, in which the evaluation circuit (11) is integrated into the carrier element (1).

8. Device according to Claim 6 or 7, in which the excitation source (21), controlled by the evaluation circuit, sends a chemical or biological substance to the inlet opening (8).

9. Device according to Claim 8, in which a valve is disposed in an inlet line between the excitation source (21) and inlet opening (8) to control the supply of medium.

10. Device according to one of the foregoing claims in which an adhesion matrix and/or a growth substrate for cells is applied to the surface (100).

11. Device according to Claim 10, in which the growth substrate is gelatin.

12. Device according to one of Claims 1 to 9, in which a cell-immobilizing medium is applied to surface (100).

13. Device according to Claim 12, in which the medium is polystyrene, preferably negatively charged polystyrene.

14. Device according to one of the foregoing claims in which at least one cell (6) is immobilized at the surface.

15. Device according to one of the foregoing claims in which a depression is created in the surface of the carrier device prepared for receiving cells, by contrast with surface areas (101) not prepared for receiving cells, said depression being preferably at least 100 nm deep.

16. Method for detection of a luminescence event in, at, or in the immediate vicinity of a cell, a cell cluster, or a tissue, having the following features:

- Preparation of a sensor device according to one of Claims 1 to 16,
- Immobilization of the cell at the surface (100) prepared for receiving cells,
- Introduction of a luminophore reacting with a cell metabolic product in the cell (6) or in the vicinity of the cell,
- Stimulation of the cell by a chemical or biological substance,
- Detection of a luminescence signal.

17. Method according to Claim 15 or 16, in which the luminescence signal is detected with temporal resolution.